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File: USPT

Apr 25, 1995

DOCUMENT-IDENTIFIER: US 5410150 A

TITLE: Fiber optic controller with an interface having an emitting diode and a photodetector

BSPR:

According to yet a further aspect of the invention, there is provided a key to reflect light between a transmitting optical fiber and a receiving optical fiber, said key having a base portion and a switch portion, said switch portion being movable relative to said base portion, one of said base and switch portions having a reflective surface to reflect light emitted from said transmitting fiber to said receiving fiber.

BSPR:

According to yet a further aspect of the invention, there is provided a fiber finder operable to allow the fibering of a plurality of keys on a keyboard each of which keys include a plurality of optical fibers, said fiber finder comprising an electrical keypad having a plurality of keys and being electrically connected to a controller, said keyboard being an optical key keyboard having said plurality of keys and being connected to said controller by a plurality of transmitting and receiving optical fibers, a transmitting and receiving fiber running to each of said keys of said optical switch keyboard, a plurality of light emitting diodes emitting visible light at a first frequency to said transmitting fibers and a plurality of light emitting diodes emitting visible light at a second frequency to said receiving fibers, each of said plurality of keys on said electrical keypad being operable to illuminate predetermined ones of light emitting diodes which emit visible light at said first frequency and said light emitting diodes emitting visible light at said second frequency, each of said plurality of keys on said keypad corresponding to a respective key on said optical switch keyboard following the wiring of said switches on said optical switch keyboard.

DRPR:

FIG. 4B is an enlarged view of the cylindrical protuberance into which a typical optical fiber is mounted, which protuberance extends towards the light emitting diodes mounted in the connector;

DEPR:

With reference to FIG. 6, the fiber optic interface 74 is illustrated in more detail. It comprises an LED driver 134

operable to receive control signals from the microcontroller 110 by an address bus generally illustrated at 140. A plurality of LEDs generally illustrated at 141 are connected to LED driver 134 through a plurality of series resistors 142, each of the plurality of LEDs 141 being operable to transmit light through a set of optical fibers within fiber optic cable 73 (FIG. 2). A modulating clock 143 is connected to the enable pin of the LED driver 134 and a plurality of phototransistor networks generally illustrated at 144 are operable to receive light carried by a set of optical fibers within the fiber optic cable 73 and convert the light into an electrical signal. A constant LED 150 is operable to optically bias the phototransistor networks 144 and a plurality of signal discriminators 151, such as the MC3373 integrated circuit are each operable to discriminate in the output signal of one of the plurality of phototransistor networks 144 between noise and a signal and to initiate a signal to the microcontroller 134 upon detecting a signal.

DEPR:

A fiber finder is generally illustrated at 191 in FIG. 10. The fiber finder 191 is used to properly wire or "fiber" the optical keypad 44 so that the correct operating functions of the spa 10 result when a particular key on keypad 44 is depressed. In the fiber finder 191, a plurality of light emitting diodes ("LED's") used as transmitters in the optic socket 195 of the fiber finder 191 emit green radiation and will illuminate up to eight (8) fibers extending to the keypad 44 from each LED. A series of LED's in the optic socket 195 which represent the photo transistors in the interface or connector 74 emit red radiation and illuminate up to four (4) fibers running to the optical keypad 44, according to the key being depressed on the electrical keypad 192. When, for example, a key on the electrical keypad 192 is depressed, a microprocessor in the fiber finder 191 will illuminate the correct LED's to be illuminated. This will result in a plurality of fibers being illuminated at the keyboard 44 by the red emitting LED's and by the green emitting LED's in the optic insert socket 195. The correct key on the optical keypad 44 is then wired or fibered by the assembler or technician taking one of the green coloured fibers and pressing it into the transmitter recess 90 (FIG. 3A) of the key 51. He will then take one of the red coloured fibers and likewise press it into the receiver recess 91 of the key 51. A sharp edge trims the fibers which extend from the recesses adjacent the concave surface 84. The first key is then properly fibered or wired.

DEPR:

If, however, the key such as key 55 is depressed, the mirror surface 84 (FIG. 3) will be placed in the plane of the light emerging from the transmitting optical fiber. The light emitted will be reflected by the mirror surface 84 and redirected through the receiving optical fiber to the fiber optic interface or connector 74 to impinge upon one of the plurality of phototransistor diodes 144. This phototransistor network 144 is biased by the constant LED 150 to be sensitive, as earlier stated, to the difference between noise and a faint correct

signal in the midst of the noise. The signal discriminator 151 detects this amplified signal amid the noise and instructs the microcontroller 110 that a key has been depressed. By keeping track of which of the plurality of LEDs 141 and which of the plurality of phototransistor networks 144 are operating together, the microcontroller 110 determines which key was depressed, in this case the on-off switch 55.

CLPR:

1. A fibre optic controller comprising a keyboard, at least one key mounted in said keyboard, a transmitting fiber extending to each of said keys, a receiving fiber extending from each of said keys, an interface including a light emitting diode to provide radiation to said transmitting fibre and a photodetector to detect radiation received by said receiving fibre, said interface having a male and female member and being positioned between the ends of said receiving and transmitting fibres ~~remote~~ from the ends of the ends of said transmitting and receiving fibres positioned in said keyboard, an electronic controller being operable from said interface, said receiving and transmitting fibers also being mounted in said interface, each of said keys having a reflective surface to reflect light between said transmitting fiber and said receiving fiber, said light emitting diodes and said photodetectors being mounted in one of said male or female members of said interface and said transmitting and receiving fibres being mounted in the other of said male and female member of said interface.

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USPT	(((345/168)!.CCLS.)) and (keyboard)and (remote)and (illumination) and ("optical fiber ")	3	L17
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USPT	(((345/\$3)!.ccls.)) and (display)and (sheet)and (polyamide)	38	L3
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